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LATE AFTER-EFFECTS OF OCCUPATIONAL ACUTE DAMAGE TO RESPIRATORY PASSAGES BY IRRITATING GASES

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(Ob otdalennykh posledestviyakh professional'nykh ostrykh porazheniy dykhatel'nykh putey razdrazhayushchimi gazami)

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LATE AFTER-EFFECTS OF OCCUPATIONAL ACUTE DAMAGE TO RESPIRATORY PASSAGES BY IRRITATING CASES

by

N. A. Smirnova and N. P. Granik

It has been established that damage to bronchi is the most frequent late after-effect of intoxication by chlorine, phosgene, oxides of nitrogen and sulfur dioxide. Victims poisoned by these gases subsequently suffer inflammatory processes in the bronchi, bronchiectasis, abscesses, emphysema of the lungs and pneumosclerosis with symptoms of functional respiratory disturbance (V. I. Glinchikov; A. S. Abrikosov; F. I. Pozhariskiy; V. P. Lukanin; N. N. Savitskiy; A. P. Khazanov; S. S. Vayl'; K. P. Molokanov, and others). These changes caused by chlorine, phosgene and formalin poisoning can appear with attacks of bronchial asthma. In addition, instances are described of more frequent cancer of the lung in persons with occupational pneumosclerosis of toxico-chemical etiology (S. I. Ashbel'). However, many questions concerning the remote after-effects of acute intoxication by substances irritating respiratory passages are inadequately covered in the literature. Therefore, the purpose of this study was to investigate late after-effects of acute occupational poisonings by several substances which irritate respiratory passages.

We conducted a detailed examination of 88 chemical plant workers who had suffered acute industrial poisoning by chlorine (46), hydrogen chloride (2), phosgene (9), oxides of nitrogen (11), nickel tetracarbonyl (14), formaldehyde (4) and ammonia (2). Those examined included 55 men and 33 women; 71 were under 45 years of age and 17 over 45. The main occupational group was composed of operators of mechanical equipment (28) and metal workers (19). The majority of victims had been taken to the clinic within a few hours after intoxication but some (37) after more than 12-24 hours.

The acute period of intoxication proceeded with various changes in the broncho-pulmonary apparatus (pharyngolaryngitis, tracheobronchitis, toxic pneumonia, pulmonary edema, etc.), intoxication was of various degrees of severity (in 34 — light, in 49 — moderately severe, in 5 — severe). All persons suffering acute intoxication were re-examined from 1 to 20 years later, several were examined 3-7 times.

Out of 46 persons suffering acute chlorine intoxication, some changes in respiratory organs were revealed in 23; in persons suffering repeated intoxication the clinical picture of late after-effects differed from that in persons

examined after the first acute intoxication. Thus, diffuse bronchitis, sometimes with an asthmoid component, pulmonary emphysema and respiratory insufficiency of some degree or another were found in the remote period in 12 persons of the first group; in 7 of these pneumosclerosis was established roentgenologically. Among 11 persons examined for the first time pneumosclerosis was established in only 3 cases of a light degree of intoxication, bronchitis in 8 (after both light and moderately severe intoxication); only 1 revealed subatrophic pharyngolaryngitis.

The working ability of victims suffering acute chlorine intoxication also differed. Four persons suffering a second acute chlorine intoxication were placed in the group II occupational disability category because of developing pneumosclerosis, diffuse bronchitis with an asthmoid component and pronounced respiratory insufficiency; three of the repeat victims were assigned to group III disability. After the first chlorine intoxication disability was determined in only 2 patients (group II and III). Among victims examined after acute hydrogen chloride intoxication (2) subatrophic pharyngolaryngitis and moderate bronchitis were found in one suffering a medium degree of intoxication.

As was shown, 9 persons were victims of phosgene intoxication, one for the second time. This patient suffered pneumosclerosis, bronchitis, pronounced pulmonary emphysema, II degree respiratory insufficiency and was, therefore, placed in the group III disability category. In 4 patients only symptoms of moderate bronchitis were determined in the remote period (1 suffered a light degree of intoxication, 2 — moderate and 1 — severe).

Examination of 14 persons suffering acute nickel tetracarbonyl intoxication of moderate severity later revealed bronchitis in only one. Typical roentgenological changes were observed in all 14 and were treated as toxic pneumonia. These changes passed without a trace, although the literature includes indications of possible development of pneumosclerosis.

Eleven persons were examined after suffering acute intoxication by oxides of nitrogen. Pneumosclerosis with symptoms of bronchitis was found in 2 suffering severe and moderately severe intoxication; one patient with very pronounced functional disturbances of respiration was placed in the group III disability category. The remaining 7 patients suffered light intoxication by oxides of nitrogen; in these no pathology of respiratory organs was later established. After acute formaldehyde intoxication of medium severity in 2 out of 4 persons a diagnosis of moderate bronchitis with an asthmoid component was established.

Acute ammonia intoxication (2 cases) was accompanied by edema of the mucous membrane of the throat with subsequent necrosis of the tonsils; in the remote period subatrophic pharyngolaryngitis appeared in one case.

Clinical observations showed that remote after-effects of acute intoxications and their severity depend on a number of factors. Repeated acute intoxi-

cations most often lead to more severe after-effects. In all cases after repeated poisoning with substances irritating the respiratory passages changes in the lungs bore a more pronounced character: pneumosclerosis, pulmonary emphysema, diffuse bronchitis, sometimes with bronchiectasis and respiratory insufficiency of various degrees of severity were diagnosed. Pathological changes in these patients often led to disability or limited working capacity. Of 13 patients suffering repeated intoxication, groups II and III disability were established in 8 cases in later years.

Also important is the severity of clinical symptoms of acute intoxication. Of 5 patients suffering severe intoxication pathology of respiratory organs was found in 2 cases in the remote period. Late after-effects appeared twice as often in persons suffering moderately severe intoxication as in those with a light degree. Thus, out of 49 persons suffering acute intoxication of a moderate degree, late after-effects were revealed in 14 and out of 34 suffering light intoxication — in 6 (without taking into account cases of repeated intoxication). The severity of pathological changes in the remote period also depended on the degree of the acute intoxication: pathological disturbances in the lungs of patients suffering severe and moderate intoxication were more pronounced than in those suffering light intoxication. This category of patients included the group II and III disabled.

We were able to establish that the course of intoxication was prolonged in persons hospitalized in the acute period after more than 12-24 hours; later pathological changes often appeared in the broncho-pulmonary apparatus (out of 37 patients entering the hospital 12-24 hours after the first acute intoxication, 12 revealed residual symptoms in the form of diffuse bronchitis).

Proper assignment of workers after acute intoxication is important. The observations showed that recommendations for rational assignment after release from the hospital were often not carried out. Out of 35 persons with changes in respiratory organs in the remote period after intoxication, 21 continued to work in contact with substances irritating the respiratory passages. Among these in later years 7 were placed in the limited working ability or disabled categories. Even among persons who did not continue to work in contact with substances with an irritating effect on respiratory organs, after acute intoxication, especially after repeated and severe acute intoxications, some changes were observed in respiratory organs.

CONCLUSIONS

1. In persons suffering acute industrial poisoning by substances irritating respiratory passages pathological changes in respiratory organs are established in the remote period. They appear as pneumosclerosis, bronchitis of various degrees of severity, bronchiectasis, pulmonary emphysema, respiratory insufficiency and often subatrophic pharyngolaryngitis.

2. The later course of the pathological process in the lungs after acute intoxication with the indicated substances depends on the severity of intoxication, the time of admittance to a hospital and return to work and proper work assignment.

3. Repeated acute intoxication leads to more severe late after-effects of poisoning by gases irritating the respiratory passages. In these patients ability to work is reduced or lose sooner than in others.

4. Persons suffering acute poisoning with substances irritating the respiratory passages must be placed under dispensary observation. Even after acute intoxication of a light degree, immediate return to work in contact with substances irritating the respiratory passages is contraindicated. According to sick leave certification these persons are subject to transfer to different work for 2 months.

REFERENCES

1. Abrikosov, A. I. In the book: Mediko-sanitarnye voprosy protivokhimicheskoy zashchity (Medico-sanitary questions of anti-gas protection). Moscow, 1932, Coll. 1., p. 85.

2. Ashbel', S. I. Gig. truda, 1959, No. 11, p. 11.

3. Vayl', S. S. Patologicheskaya anatomiya porazheniy, vyzyvayemykh otravlyayushchimi veshchestvami (Pathological anatomy of damage caused by poisons). Leningrad, 1958.

4. Glinchikov, V. I. Klinika i terapiya porazheniya boyevymi otravlyayushchimi veshchestvami (Clinical picture and treatment of damage by war gases). Moscow-Leningrad, 1931.

5. Lukanin, V. P. Trudy Sverdlovsk. med. in-ta i nauchno-issled. in-tov Sverdlovsk. oblzdravotdela. (Works of the Sverdlovsk Medical Institute and the Scientific Research Institutes of the Sverdlovsk regional public health department). Sverdlovsk, 1940, Coll. 13, p. 202.

6. Molokanov, K. P. Rentgenologiya professional'nykh zabolevaniy i intoksikatsiy (Roentgenology of occupational diseases and intoxications). Moscow, 1961, p. 1.

7. Pozhariskiy, F. I. Pozdniye i otdalennye posledstviya otravleniy BOV. (Late and remote after-effects of war gas poisonings). Moscow-Leningrad, 1939.

8. Savitskiy, N. N. Chastnaya patologiya i terapiya porazheniy boyevymi otravlyayushchimi veshchestvami (Particular pathology and treatment of damage by war gases). Leningrad, 1941.

9. Khazanov, A. T. Arkh. pat., 1946, Vol. 5-6, p. 95.